

# Distributed Restoration

## Development and demonstration of Black Start from DER

### Introduction

The Distributed Restoration project is a partnership between National Grid Electricity System Operator (ESO), SP Energy Networks (SPEN) and TNEI (a specialist energy consultancy) that has been awarded £10.3 million of Network Innovation Competition (NIC) funding.

The project is exploring how distributed energy resources (DER) can be used to restore power in the highly unlikely event of a total or partial shutdown of the National Electricity Transmission System. Past and current approaches rely on large power stations but as the UK moves to cleaner, greener and more decentralised energy, new options must be developed. The enormous growth in DER presents an opportunity to develop a radically different approach to system restoration. However, there are significant technical, organisational and commercial challenges to address.

### Project Approach

The project will tackle these challenges in a three-year programme (Jan 2019 – Mar 2022) that will develop and demonstrate new approaches. Case studies on the SP Distribution (SPD) and SP Manweb (SPM) networks will be used to explore options then design and test solutions through a combination of detailed off-line analysis, stakeholder engagement and industry consultation, desktop exercises, and real-life trials of the re-energisation process. Three areas of work will cover the wide range of issues to enable Black Start services from DER:

- The **Power Engineering & Trials** work stream is concerned with assessing the capability of GB distribution networks and installed DER to deliver an effective restoration service. It will identify the technical requirements that should apply on an enduring basis. This will be done through detailed analysis of the case studies and progression through multiple stages of review and testing to achieve demonstration of the Black Start from DER concept in 'live trials' on SPEN networks.
- The **Organisational & Systems** work stream will consider the restoration process including different roles, responsibilities and relationships needed across the industry to achieve distributed restoration at scale. It will specify the requirements for information systems and telecommunications, recognising the need for resilience and the challenges of coordinating Black Start across a large number of parties.
- The **Procurement & Compliance** work stream will address the best way to deliver the concept for customers. It will explore the options and trade-offs between competitive procurement solutions and mandated elements. It will make recommendations on the procurement strategy aiming to be as open and transparent as possible while reflecting wider industry discussions on related topics like the DSO transition and Whole System Planning. It will feed into business as usual activities to make changes as necessary in codes and regulations.

### Project Progress

Current activities are focused on reviewing technical aspects of DER-based restoration in a number of case study locations that will support detailed analysis and testing within the project. Each case study is built around an 'anchor' resource with 'grid forming' capability, i.e. the ability to establish an independent voltage source and then energise parts of the network and other resources. Then it is intended that other types of DER, including batteries if available, join and help grow the Power Island, contributing to voltage and frequency control. The ultimate goal is to establish a Power Island with sufficient capability to re-energise parts of the transmission network and thereby accelerate wider system restoration.

We are also currently establishing a Stakeholder Advisory Panel, where a broad set of representatives will review our activities and help guide project direction. Through our wider stakeholder engagement activities, such as the webinar we held on Friday 29<sup>th</sup> March and our attendance at the forthcoming Utility Week Live conference, we are seeking to engage all interested parties in all aspects of project learning.

Further information on the project is available on our website:

<https://www.nationalgrideso.com/project-black-start-from-der>

Or come and talk to us on stand G22 at the NEC in Birmingham on 21-22 May (<http://www.utilityweeklive.co.uk/>).